computer control in a glovebox under an atmosphere of high-purity argon. A steady-state current of 1 A (~125 mA/cm^2) was used with a 1-second, 2 A (~250 mA/cm^2) pulse applied every minute. This allowed the overall cell resistance to be calculated. The cells were discharged to a cutoff voltage of 0.5 V.

While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of illustration and not limitation.

What is claimed is:

1. A method for the manufacture of an electrode for an energy storage and conversion device, comprising

providing a feedstock mixture comprising an effective quantity of a source of elemental sulfur and a metal sulfide, an effective quantity of a source of elemental selenium and a metal selenide, or an effective quantity of a source of elemental tellurium and a metal telluride; and

thermally spraying the feedstock mixture onto a substrate, to produce a film of the active material having a thickness in the range from about 1 to about 1000 microns.

2. The method of claim 1, wherein the feedstock mixture comprises a source of elemental sulfur and metal sulfide.

3. The method of claim 2, wherein the metal sulfide is FeS_2, CoS_2, WS_2, NiS_2, or MoS_2.

4. The method of claim 3, wherein the metal sulfide is FeS_2.

5. The method of claim 1, wherein the feedstock mixture further comprises a second inert, thermally protective barrier coating.

6. The method of claim 1, wherein the feedstock mixture comprises elemental sulfur and FeS_2.

7. The method of claim 1, wherein thermal spraying is by dc-arc plasma spray.

8. The method of claim 1, wherein the films have a thickness in the range from about 5 to about 200 microns.

9. The method of claim 1, wherein the feedstock active material is microstructured.

10. The method of claim 1, wherein the feedstock active material is nanostructured.

11. A method for the manufacture of an electrode for an energy storage and conversion device, comprising

ball-milling an active material feedstock comprising a metal sulfide with from about 1 to about 30 % by weight of a source of elemental sulfur, a metal selenide with from about 1 to about 30 % by weight of a source of elemental selenium, or a metal telluride with from about 1 to about 30 % by weight of a source of elemental tellurium to provide a feedstock for thermal spray; and

thermally spraying the feedstock for thermal spray onto a substrate, to produce a film of active material having a thickness in the range from about 1 to about 1000 microns.

12. The method of claim 11, wherein the feedstock mixture comprises a source of elemental sulfur and metal sulfide.

13. The method of claim 12, wherein the metal sulfide is FeS_2, CoS_2, WS_2, NiS_2, or MoS_2.

14. The method of claim 13, wherein the metal sulfide is FeS_2.

15. The method of claim 11, wherein the feedstock mixture further comprises a second inert, thermally protective barrier coating.

16. The method of claim 11, wherein the feedstock mixture comprises elemental sulfur and FeS_2.

17. The method of claim 11, wherein thermal spraying is by dc-arc plasma spray.

18. The method of claim 11, wherein the film has a thickness in the range from about 5 to about 200 microns.

19. The method of claim 11, wherein the feedstock active material is microstructured.

20. The method of claim 11, wherein the feedstock active material is nanostructured.

21. A electrode for an energy storage and conversion device, comprising

a substrate; and

a layer of an active material comprising a metal sulfide, metal selenide, or metal telluride, and having a thickness in the range from about 1 to about 1000 microns deposited on the substrate, wherein the active material decomposes or transforms to a material unsuitable for use in an electrode at thermal spray temperatures.

~~22. The electrode of claim 21, wherein the layer of active material has a thickness in the range from about 1 to about 200 microns.~~

23. The electrode of claim 21, wherein the layer of active material has a thickness in the range from about 5 to about 114 microns.

24. The electrode of claim 21, wherein the active material is a metal sulfide.

25. The method of claim 21, wherein the active material is FeS_2, CoS_2, WS_2, NiS_2, or MoS_2.

26. The electrode of claim 21, wherein the active material is FeS_2.

27. The method of claim 21, wherein the active material is microstructured.

28. The method of claim 21, wherein the active material is nanostructured.

29. A method for the manufacture of an electrode, comprising

providing a feedstock mixture comprising an effective quantity of a protective barrier coating comprising a source of elemental sulfur and pyrite; and

thermally spraying the feedstock mixture onto a substrate, to produce a film of pyrite active material having a thickness in the range from about 1 to about 1000 microns.

30. The method of claim 29, wherein the feedstock mixture comprises from about 1 to about 30% by weight of elemental sulfur.

31. The method of claim 29, wherein thermal spraying is by dc-arc plasma spray.

32. The method of claim 29, wherein the film has a thickness in the range from about 1 to about 200 microns.

33. The method of claim 29, wherein the film has a thickness in the range from about 5 to about 114 microns.

34. A method for the manufacture of a cathode, comprising

ball-milling pyrite with from about 1 to about 30 % by weight of elemental sulfur, to provide a feedstock comprising sulfur and pyrite; and

thermally spraying the feedstock solution onto a substrate, to produce a film of pyrite active material having a thickness in the range from about 1 to about 200 microns.

35. The method of claim 34, wherein thermal spraying is by dc-arc plasma spray.

36. The method of claim 34, wherein the film has a thickness in the range from about 5 to about 114 microns.

37. A cathode, comprising

a substrate; and

a layer of pyrite active material deposited on the substrate, wherein the layer of pyrite has a thickness in the range from about 1 to about 1000 microns.

38. The method of claim 37, wherein thermal spraying is by dc-arc plasma spray.

39. The method of claim 37, wherein the layer has a thickness in the range from about 1 to about 200 microns.

40. The method of claim 37, wherein the layer has a thickness in the range from about 5 to about 114 microns.